



Overview of Wastewater Treatment Facility



Aerated Lagoon



Influent to wetland cells

| Delta Correctional Facility Statistics | |
|--|------------------------|
| Nearest Town: | Delta |
| County: | Delta |
| River Basin: | Lower Gunnison |
| Receiving Water Body: | Roubideau Creek |
| Year Constructed: | 1997 |
| Population: | 492 inmates, 100 staff |
| Elevation (feet): | 4977 |
| Design Flow (mgd): | 0.067 |
| Average Flow (mgd): | 0.038 |
| Size (acres): | 1.38 |

Facility Description

The Delta Correctional Center is a minor municipal lagoon system. The facility consists of two aerated lagoons, a polishing pond, a surface flow constructed wetland, and a chlorine contact chamber. The influent is measured by calibrated run time meters on the influent pumps. The effluent flow is measured by a 45° v-notch weir.

Lagoons

The Delta lagoon systems consist of 3 aerated cells operated in series. The aerators are operated 24 hours a day, 7 days a week. Effluent from pond three can be taken from two different elevations. The lagoon system is detailed in the table below.

| Lagoon Information | | | |
|----------------------------------|--------|--------|-------|
| Cell No.: | 1 | 2 | 3 |
| Surface Area (sq. ft.) | 13,470 | 14,640 | 9,753 |
| Avg. Depth (ft) | 9.51 | 9.55 | 9.29 |
| Avg. Volume (Million gallons) | 0.597 | 0.653 | 0.392 |
| Detention time (days) | 8.8 | 9.7 | 5.8 |
| Aerator size (hp) | 16 | 6 | 2 |

Background Information

The existing lagoon system was not able to meet discharge permit requirements for TSS and BOD removal. Addition of a wetland system for polishing of the lagoon effluent was attractive for several reasons.

- Wetlands do not require a highly trained operator
- Climate at this site is favorable for a wetland system
- A baseball field adjacent to the lagoons provided adequate space to install a wetland.

Energy Analysis

The treatment facility uses a lift station with a 5hp motor to provide the head requirements needed for flow through the system. The lagoons utilize aerators and mixers. A total of 4 Tornado mixers and 4 Aeromix systems are used in the lagoons.

Wetland Design

Design Methods

Technical literature was utilized to determine key design parameters for reducing TSS. The hydraulic residence time and the aspect ratio were determined to be the most critical design issues. The wetland was designed to provide a minimum hydraulic residence time of 5 days and an average aspect ratio greater than 10 to 1.

Objectives

The treatment wetland was designed primarily to address TSS permit compliance issues.

Size

The wetland system consists of one treatment cell with an area of 60,000 ft². The wetland cell has a substrate thickness of 12 inches and an operating water depth of 24 inches.



Shape

The wetland cell is rectangular with an aspect ratio of 10 to 1. The flow path is serpentine in order to maximize the aspect ratio and minimize short-circuiting.

Hydraulics

The inlet to the wetland cell is an 8" aluminum gated pipe. An HDPE liner eliminates groundwater influences. Adjustable irrigation pipes are used to adjust the water level in the pond. The water flows by gravity through the wetland system.

Treatment Goals

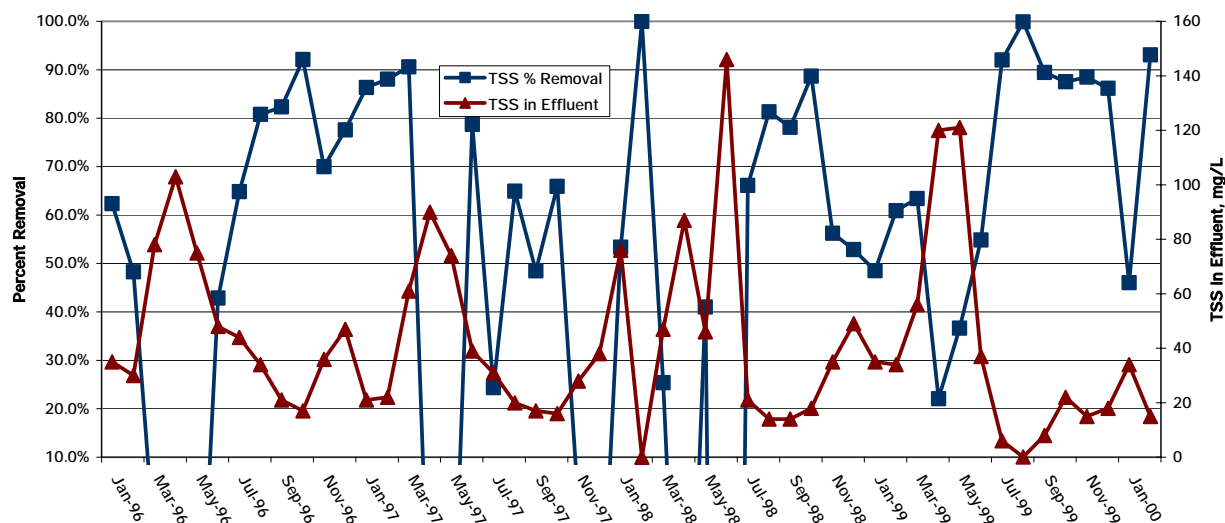
| Permitted Discharge Limitations | |
|---------------------------------|--|
| Oil and Grease: | 10 mg/l (Daily Max) |
| BOD ₅ : | 30 mg/l (30-day ave) |
| BOD ₅ Removal: | 85% |
| TSS: | 75 mg/l (30-day ave) |
| PH, su (min – max) | 6.0 – 9.0 (Daily Max) |
| Chlorine Residual: | 0.5 mg/l (Daily Max) |
| Fecal Coliform Bacteria: | 6,000 organisms per 100 ml (Daily Max) |

Water Quality Data

TSS Data

The TSS graph plots the percent removal on the left axis and TSS in mg/l in the effluent on the right axis. The average monthly TSS in the influent, since the wetland implementation, has been 94 mg/l and the average monthly effluent has been 39 mg/l. This meets the permit discharge requirement of 75 mg/l.

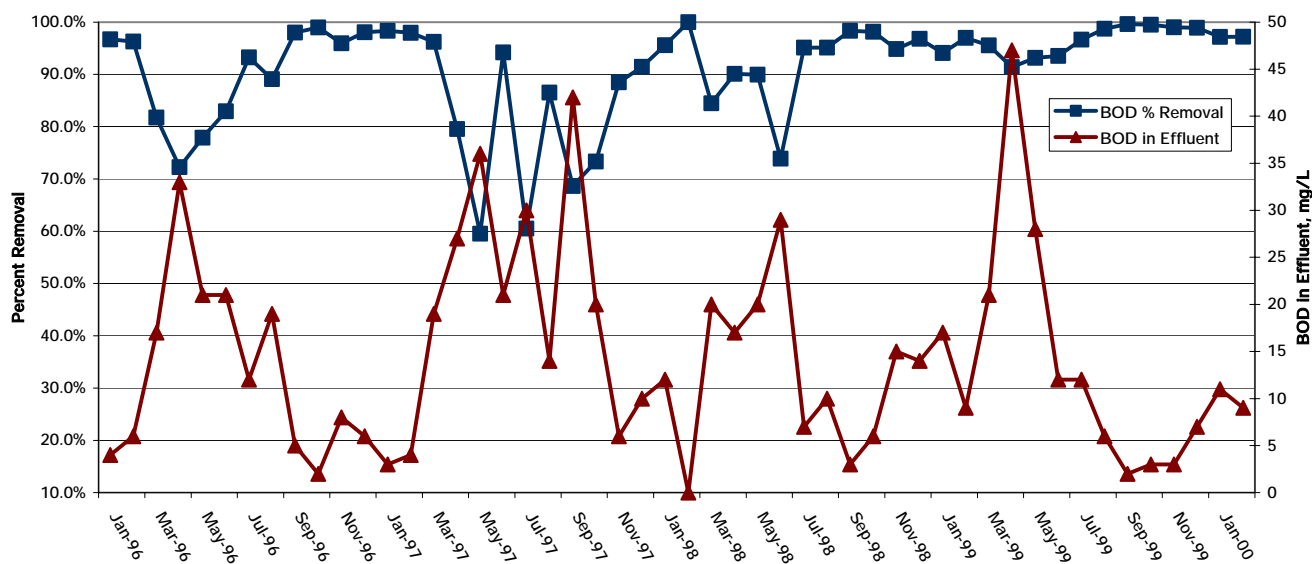
Delta TSS Performance
Wetlands Completed 1997



BOD Data

The BOD data is plotted similarly to the TSS data, with mg/l in the effluent on the right axis, and percent removal on the left axis. The average monthly influent amount has been 277 mg/l and the average monthly effluent amount has been 15 mg/l.

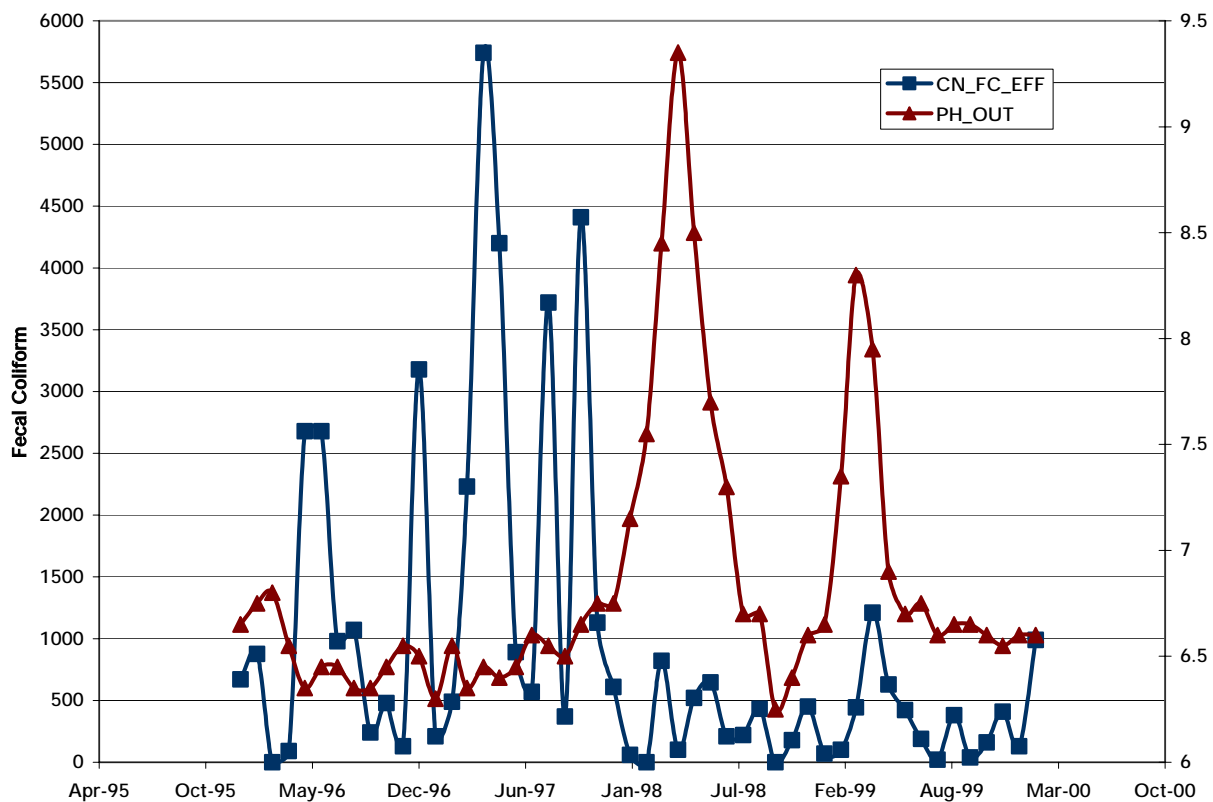
Delta BOD Performance
Wetlands Completed 1997



pH and Fecal Coliform

Data for these two categories have been plotted on the same graph. Data reflect the quality of the effluent; no influent measurements are taken for these parameters. The pH values plotted are an average of the minimum and maximum 30-day values that are reported in the monthly reports. Since the wetland implementation, pH values have consistently stayed within the allowable range of 6.5 to 9.

Delta pH and FC in Effluent



General Ecological Setting

Rocky outcrops surrounding the area are generally woodlands dominated by species of juniper that often occur with sagebrush. Other areas of the landscape are dominated by saltbush. These are usually relatively pure saltbush stands, often sparsely vegetated with bare soil constituting most of the land surface.

Cell Vegetation

Vegetation cover in the single cell is 95 percent cattail (*Typha latifolia*) and 5 percent Baltic rush (*Juncus balticus*). Foxtail barley (*Hordeum jubatum*) and tamarisk (*Tamarix chinensis*) were also observed during the site visit.

Planting/Seeding

In December 1997, 20,000 cattails were planted. In Spring 1999 the wetland was replanted by breaking the seed heads of cattails.

Weeds

A few single stems of tamarisk, a noxious weed, were noted during the site visit. Tamarisk consumes large quantities of water, possibly more than woody native plant species that occupy similar habitats.

Maintenance Issues

Removal of tamarisk and follow-up monitoring should prevent establishment of the species.

Wildlife

The wetland provides habitat for songbirds and small mammals. The general wildlife habitat and diversity are relatively low. Total functional points were 1.3.

Wetland Biodiversity Functional Assessment

| Wetland Biodiversity Functional Assessment. | | |
|---|---------------------------------|-----------------|
| Function and Value Variables | Functional Points (0.1 to 1) | Possible Points |
| <u>General Wildlife Habitat</u> | 0.5 (mod.) | 1 |
| General Fish/Aquatic Habitat | 0.0 | 1 |
| Production Export/Food Chain Support | 0.4 (mod.) | 1 |
| Habitat Diversity | 0.2 (low) | 1 |
| Uniqueness | 0.2 (low) | 1 |
| Total Points | 1.3 (26%) | 5 |
| Wetland Category (I, II, III, or IV) | III | |

Human Use

The constructed wetland is part of the larger treatment facility used as an overall training environment for operators. This wetland serves an important educational purpose because it is used to train inmates in the management of wastewater treatment facilities. This wetland has moderate aesthetic value.

Overall Site Comments

The Delta correctional Facility treatment wetland operates as intended. This facility supports healthy plants and consistently meets discharge permit requirements.